

## ABSTRACT

A method of measuring nonstationary oscillatory motion of a sample is disclosed. The method comprisesing the steps of illuminating a sample with an illuminating optical fiber; detecting reflectedbackscattered light from the sample with a plurality of detecting optical fibers; coupling each optical fiber of the plurality of detecting optical fibers with a modulating optical fiber; and generating measurements of the nonstationary oscillatory motion of the sample. An apparatus for measuring nonstationary oscillatory motion of a sample is also disclosed. The apparatus comprises a light source; an illuminating optical fiber coupled to the light source; and a plurality of optical fibers positioned around the illuminating optical fiber and coupled to receive reflectedbackscattered light from the sample.